STATUS OF THE CLAIMS

Claims 1-21. (Canceled)

22. (Previously presented) A method of forming a copper interconnect structure providing electrical connection for a semiconductor device, comprising the steps of:

forming a first contact opening into a first insulating layer formed over a semiconductor substrate;

forming a conductive plug in said first contact opening, wherein said conductive plug is in contact with said first insulating layer;

forming a second insulating layer over said conductive plug and said first insulating layer;

forming a second contact opening in said second insulating layer;

forming a barrier layer in said second contact opening;

forming a copper conductor over said barrier layer; and

forming a top heat-radiating layer comprising aluminum nitride, wherein said heat-radiating layer is formed completely on an upper surface portion of said copper conductor.

23. (Original) The method of claim 22 further comprising the step of chemical mechanical polishing said copper layer and said barrier layer.

24. (Original) The method of claim 22 further comprising the step of cleaning said upper surface portion of said copper conductor prior to the formation of said aluminum nitride layer.

25. (Original) The method of claim 22, wherein said aluminum nitride layer is formed by deposition, to a thickness of approximately 300 Å.

26. (Original) The method of claim 22, wherein said step of forming said aluminum nitride layer includes a deposition process.

27. (Original) The method of claim 22, wherein said step of forming said aluminum nitride layer includes a sputtering process.

28. (Original) The method of claim 22, wherein said barrier layer is formed of a refractory metal compound, said refractory metal compound being selected from the group consisting of refractory metal nitrides, refractory metal carbides, and refractory metal borides.

29. (Previously presented) A method of forming an interconnect structure providing electrical connection for a semiconductor device comprising:

forming a contact opening in an insulating layer of said device;

forming a first conductive plug within said contact opening;

forming a heat-radiating layer comprising aluminum nitride, wherein said heat-radiating layer is formed completely on an upper surface portion of said first conductive plug; and

depositing a second conductive plug on said heat-radiating layer in electrical contact with said first conductive plug.

30. (Previously presented) The method of claim 29 further comprising the step of depositing a barrier layer in said contact opening and before said step of depositing said first conductive plug.

31. (Previously presented) The method of claim 29 further comprising the step of cleaning said upper surface portion of said first conductive plug prior to the formation of said aluminum nitride layer.

32. (Original) The method of claim 29, wherein said aluminum nitride layer is formed by deposition, to a thickness of approximately 300 Å.

33. (Original) The method of claim 29, wherein said step of forming said aluminum nitride layer includes a deposition process.

34. (Original) The method of claim 29, wherein said step of forming said aluminum nitride layer includes a sputtering process.

35. (Previously presented) The method of claim 29, wherein said first conductive plug is selected from the group consisting of aluminum, gold, silver, tungsten, and copper.

Claims 36-57 (Canceled).

58. (Previously presented) A method of forming a copper interconnect structure providing electrical connection for a semiconductor device, comprising the steps of:

forming a first contact opening into a first insulating layer formed over a semiconductor substrate;

forming a first conductive plug in said first contact opening;

forming a second insulating layer over said conductive plug and said first insulating layer;

forming a second contact opening in said second insulating layer;

forming a barrier layer in said second contact opening;

forming a second conductive plug over said barrier layer; and

forming a heat-radiating layer, wherein said heat-radiating layer is formed completely on an upper surface portion of said second conductive plug.

59. (Canceled).

60. (Previously presented) The method of claim 22, wherein said top heat-radiating layer is formed from approximately 100 Å to approximately 1000 Å thick.

61. (Previously presented) The method of claim 29, wherein said heat-radiating layer is formed from approximately 100 Å to approximately 1000 Å thick.

62. (Previously presented) The method of claim 58, wherein said heat-radiating layer is formed from approximately 100 Å to approximately 1000 Å thick.